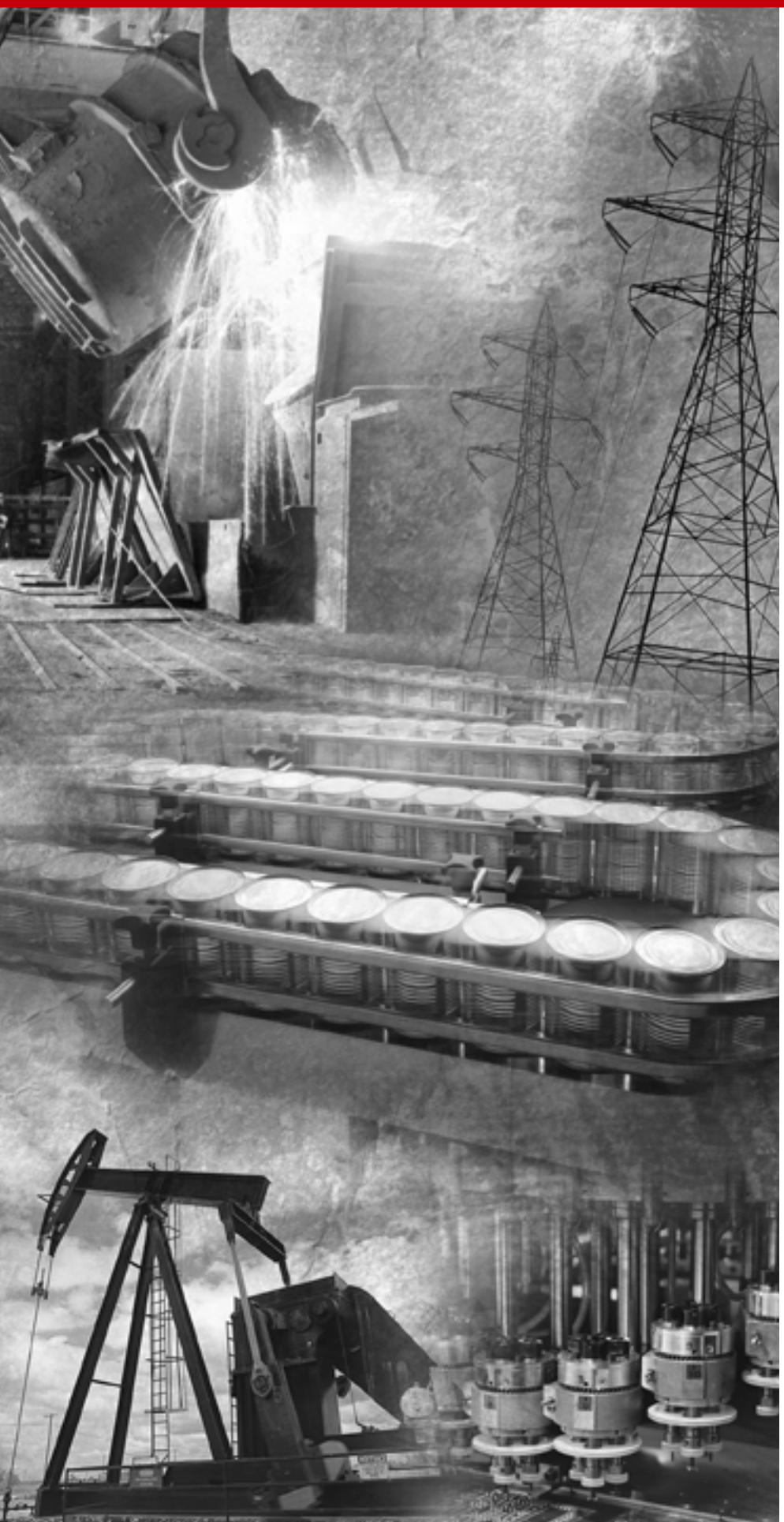

Allen-Bradley

Digital Timing Relay/Counter

700-HXM

User Manual

Rockwell Automation

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION

Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss

Attention statements help you to:

- identify a hazard
- avoid a hazard
- recognize the consequences

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

Allen-Bradley is a trademark of Rockwell Automation

European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC — Generic Emission Standard, Part 2 — Industrial Environment
- EN 50082-2 EMC — Generic Immunity Standard, Part 2 — Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61010-1 safety requirements for electrical equipment for measurement, control and labratory use--Part 1 General Safety Requirements.

This equipment is classified as open equipment and must be mounted as instructed in an enclosure during operation to provide safety protection.

Manual Objectives

The purpose of this manual is to provide you with the additional information necessary to apply the 700-HXM Digital Timing Relay/Counter. Described in this manual are methods for applying and troubleshooting this product.

Who Should Use This Manual

This manual is intended for qualified personnel responsible for setting up and servicing these devices. You must have previous experience with and a basic understanding of wiring diagrams, configuration procedures, related equipment, and safety precautions.

Counter/Timer Mode Explanation

In this manual we refer to the **Timer Output Modes** with the following designations:

A–Signal ON-delay

B–Repeat Cycle

D–Signal OFF-delay

E– One Shot

F–Accumulative

Z–ON/OFF-duty Adjustable Repeat Cycle

In this manual we refer to the **Counter Output Modes** with the following designations:

N,F,C,K

For further information, see page 3-17.

For Further Information

Relays and Timers Selection Guide

- Publication 700-SG003A-EN-P

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Product Overview

Bill of Material

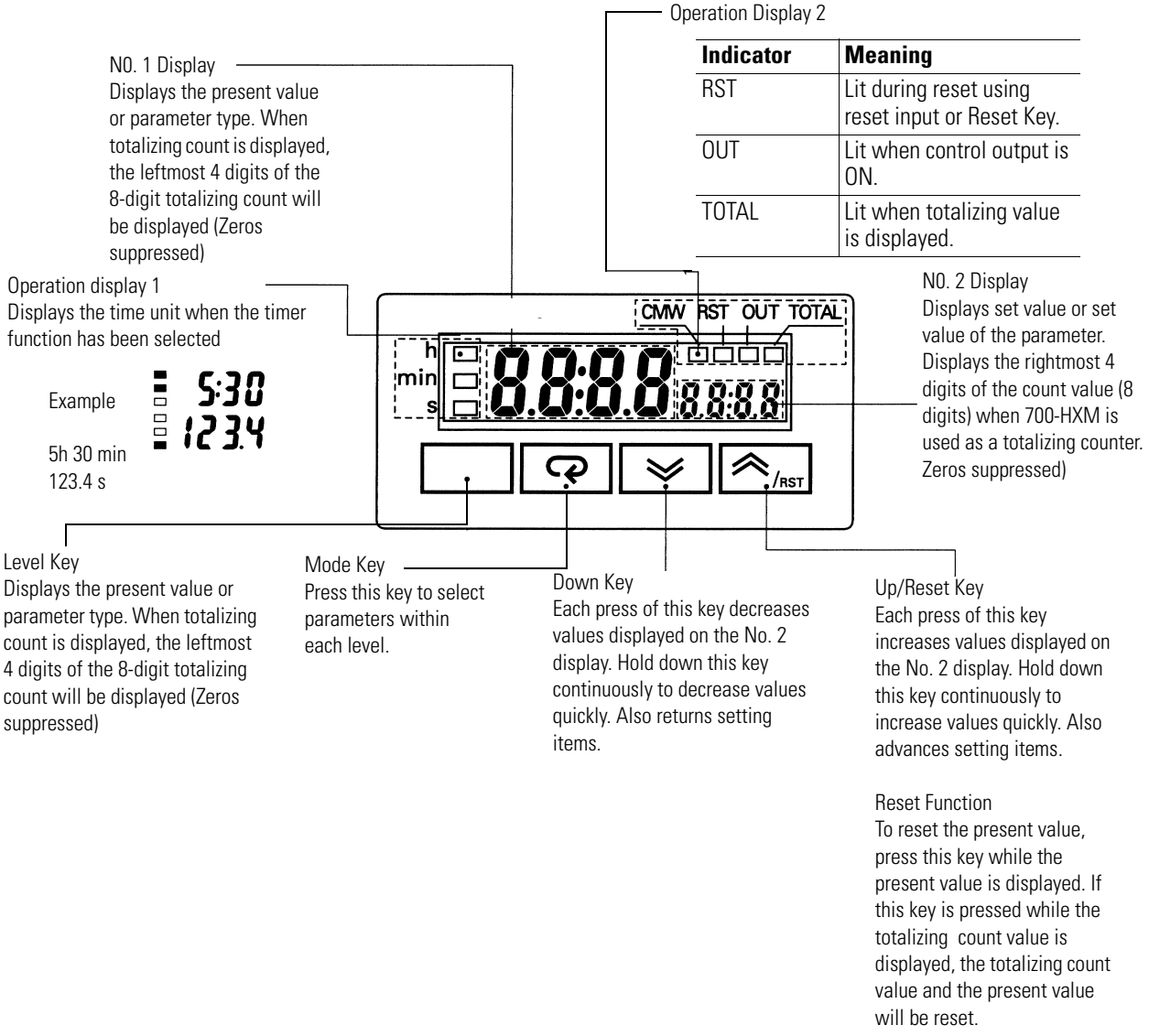
Your 700-HXM Digital Timing Relay/Counter product package includes the following items:

Item Cat. No.	Description	Quantity
700-HXM	Digital Timing Relay/Counter	1
700-HN141	Flush Mounting Adapter	1
—	Rubber Gasket	1
—	6-Language Instruction Sheet	1

Product Features

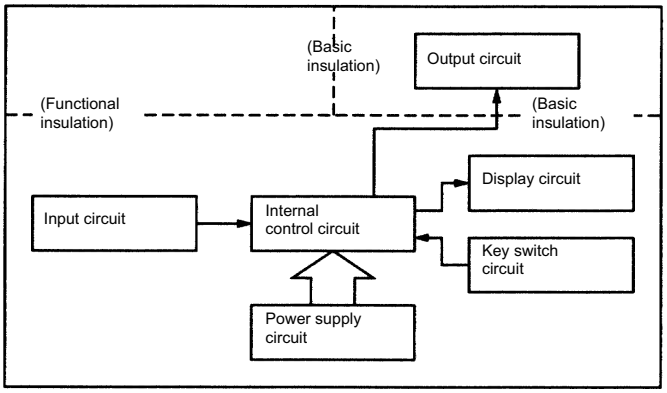
Basic Display

Here is the display for the 700-HXM Digital Timing Relay/Counter:


Operation Display 2
NO. 1 Display
Displays the present value or parameter type. When totalizing count is displayed, the leftmost 4 digits of the 8-digit totalizing count will be displayed (Zeros suppressed)
Operation display 1
Displays the time unit when the timer function has been selected
Example
5:30
123.4
5h 30 min
123.4 s
CMW RST OUT TOTAL
h
min
s
8.8:8.8
8.8:8.8
/RST
NO. 2 Display
Displays set value or set value of the parameter. Displays the rightmost 4 digits of the count value (8 digits) when 700-HXM is used as a totalizing counter. Zeros suppressed)
Level Key
Displays the present value or parameter type. When totalizing count is displayed, the leftmost 4 digits of the 8-digit totalizing count will be displayed (Zeros suppressed)
Mode Key
Press this key to select parameters within each level.
Down Key
Each press of this key decreases values displayed on the No. 2 display. Hold down this key continuously to decrease values quickly. Also returns setting items.
Up/Reset Key
Each press of this key increases values displayed on the No. 2 display. Hold down this key continuously to increase values quickly. Also advances setting items.
Reset Function
To reset the present value, press this key while the present value is displayed. If this key is pressed while the totalizing count value is displayed, the totalizing count value and the present value will be reset.

Indicator	Meaning
RST	Lit during reset using reset input or Reset Key.
OUT	Lit when control output is ON.
TOTAL	Lit when totalizing value is displayed.

Block diagram



I/O Functions

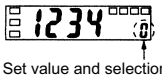
Inputs	Counter inputs	CP1/CP2	Receive count signals. Receive increment, decrement, individual, and quadrature inputs. In increment mode and decrement mode, CP1 is used for the count input and CP2 is used for count prohibit input.
		Reset	Resets the present value. (Totalizing count value is not reset.) (In increment mode or increment/decrement mode, the present value returns to 0; in Decrement Mode the present value returns to the set value.) The count input is not received during resetting. The RST indicator is lit during resetting.
	Timer inputs	Start	Starts timing.
		Reset	Resets the timer. (In elapsed time mode the time returns to 0; in remaining time mode, the time returns to the set value.) During resetting, timing stops and the control output turns OFF. The RST indicator is lit during resetting.
		Gate	Prohibits timing operation.
Outputs		OUT	Output made according to the output mode setting when the set value is reached.

Application Examples

Set-up Procedure—Using the 700-HXM Digital Timing Relay/Counter as a counter

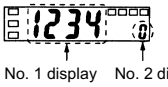
Typical Application Examples

1. Changing Set Values



Set value and selections in each display can be changed by pressing the and Keys.

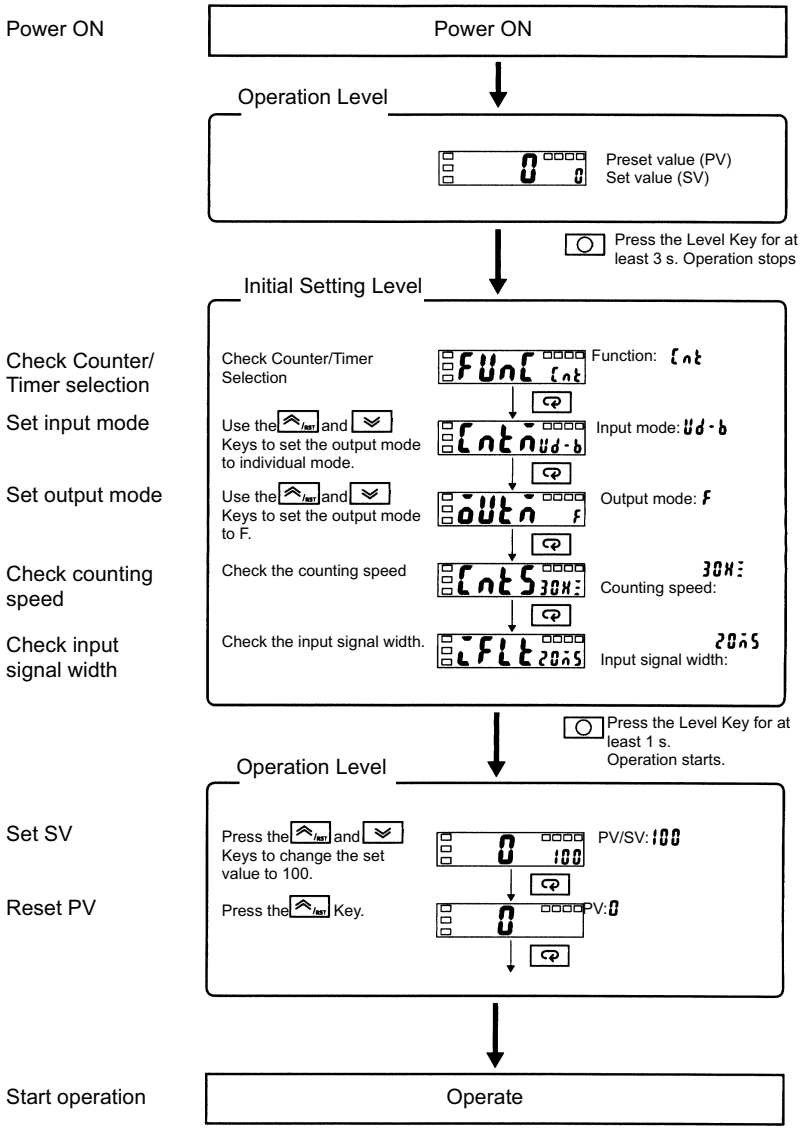
2. Displays



Typical Application

Input Mode	Individual input
Output Mode	F (overcount)
Counting Speed	30 Hz
Input signal width	20 ms
Decimal Point	None
Prescale	None

Set-up Procedure



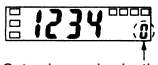
Confirming Set Values

Set values are effective two seconds after key operation is stopped or when either the or key is pressed.

Set-up procedure—using the 700-HXM Digital Timing Relay/Counter as a timer

Typical Application Examples

1. Changing Set Values



Set value and selections in each display can be changed by pressing the [RST] and [▼] Keys.

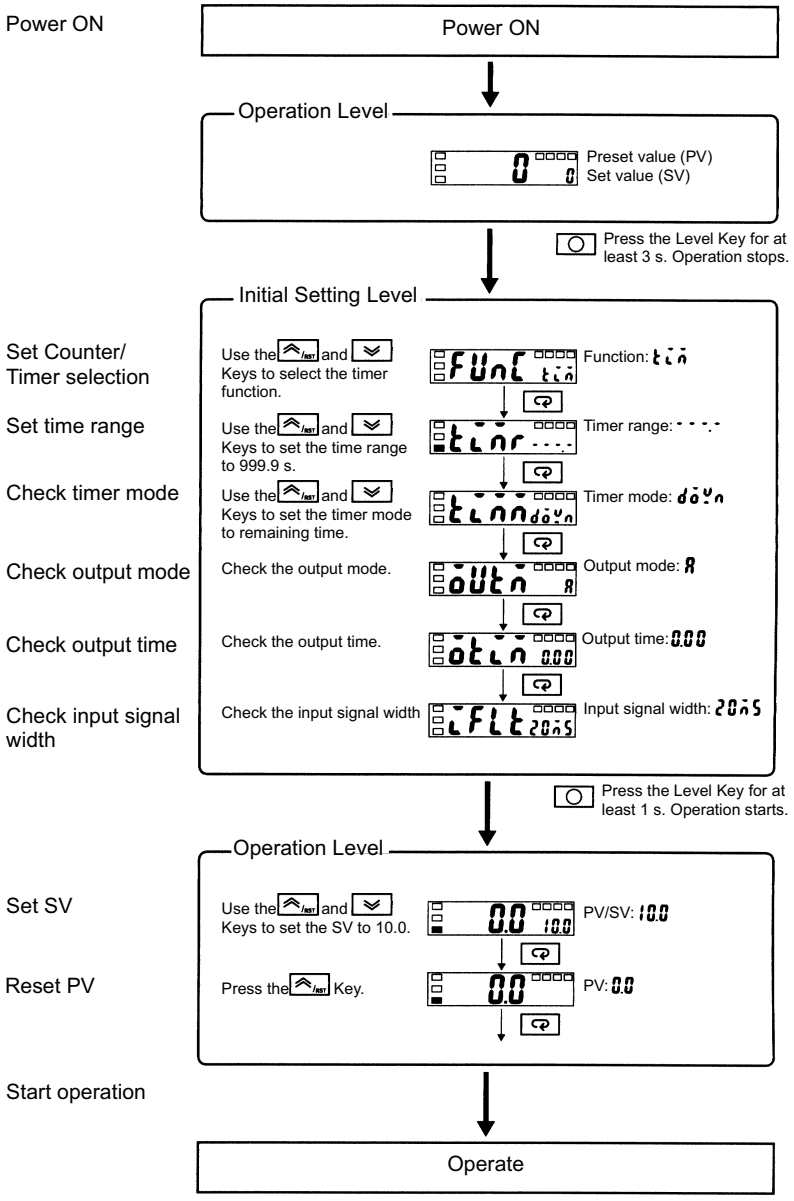
2. Displays

No. 1 display No. 2 display

Typical Application

Time range	0.0…999.9 s
Timer mode	DOWN (remaining time)
Output mode	A mode
Output time	Hold
Input signal width	20 ms

Set-up Procedure

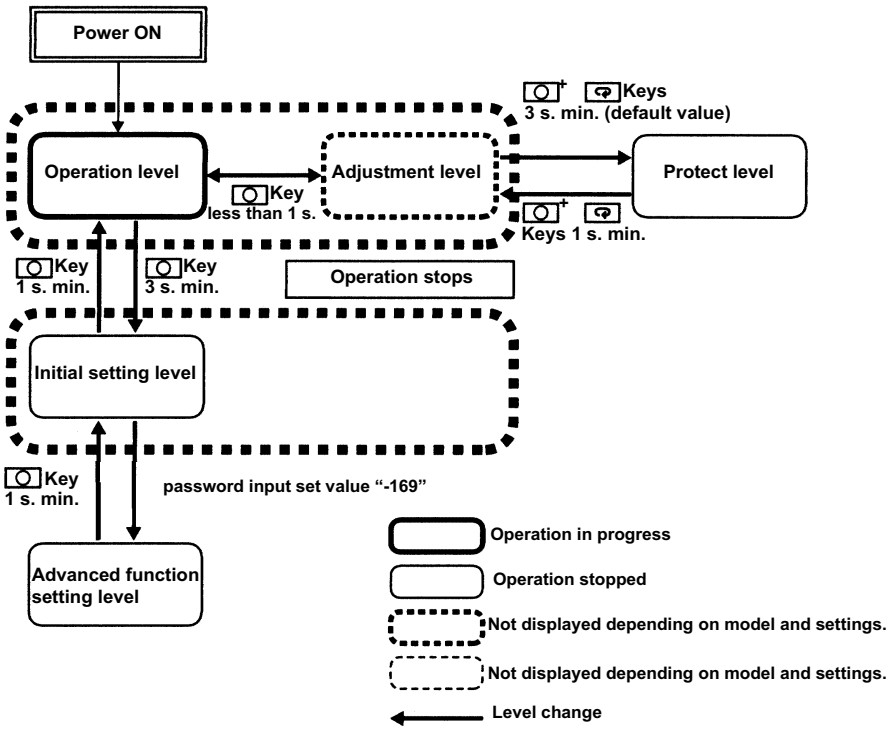

Power ON
Power ON
Operation Level
Preset value (PV)
Set value (SV)
Press the Level Key for at least 3 s. Operation stops.
Initial Setting Level
Set Counter/ Timer selection
Use the [RST] and [▼] Keys to select the timer function.
Function: tim
Set time range
Use the [RST] and [▼] Keys to set the time range to 999.9 s.
Timer range: ---.-
Check timer mode
Use the [RST] and [▼] Keys to set the timer mode to remaining time.
Timer mode: dwn
Check output mode
Check the output mode.
Output mode: A
Check output time
Check the output time.
Output time: 0.00
Check input signal width
Check the input signal width
Input signal width: 20ms
Press the Level Key for at least 1 s. Operation starts.
Operation Level
Set SV
Use the [RST] and [▼] Keys to set the SV to 10.0.
PV/SV: 10.0
Reset PV
Press the [RST] Key.
PV: 0.0
Start operation
Operate

Confirming Set Values

Set values are effective two seconds after key operation is stopped or when either the [O] or [↵] key is pressed.

Setting 700-HXM Digital Timing Relay/Counter specifications after turning on power.

In the following descriptions, all the parameters are introduced in the display sequence. Some parameters may not be displayed depending on the protection settings and operating conditions.



Note: Of these levels, the initial setting level, and advanced function setting level can be used only when operation has stopped. Control output is stopped when these three levels are selected. When switched back to the operation level from one of these levels, operation will start.

Description of Levels

Operation Level

- This level is displayed when you turn the power ON. You can move to the protect level, initial setting level, and adjustment level from the operation level.
- Normally, select this level during operation.
- During operation, the present value, set value, totalizing count value, and setting number of SV-bank can be monitored using the key.

Adjustment Level

- To select this level, press the key once for less than one second.
- This level is for entering set value (SV 0…3) for operation. This level contains parameters for set value of SV-bank, and cycle time (timer Z mode).
- You can move to the top parameter of the operation level, protect level, or initial setting level from here.

Initial Setting Level

- To select this level, press the Key for at least three seconds in the operation level or adjustment level.
- This level is for selecting the function, input mode, time range, timer mode, output mode, output time, counting speed, input signal width, decimal point position, prescale value, and rising/falling edge for input signal.
- You can move to the advanced function setting level from this initial setting level. To return to the operation level, press the key for at least one second.

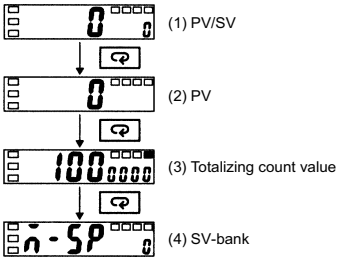
Protect Level

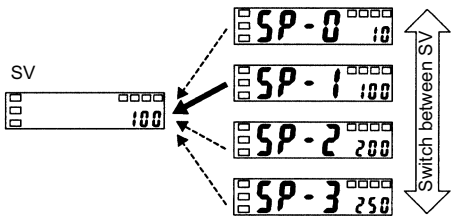
- To select this level, simultaneously press the and keys for at least three seconds (default value). This level is to prevent unwanted or accidental modification of parameters. Protected levels will not be displayed, and so the parameters in that level cannot be modified.

Advanced Function Setting Level

- To select this level, you must change the initial settings in the protect level to "0" and then enter the password ("-169") in the initial setting level.
- This level is for initializing settings, enabling SV-bank and totalizing counter use, setting display auto-return time, and move- to-protect-level time.
- You can move to the initial setting level from this level.

Parameters—Operation Level





1. PV/SV

This display appears when the power is turned ON. No. 1 display shows the present value and No. 2 display shows the set value. The values displayed will be determined by the settings for Counter/Timer selection, time range, timer mode, and decimal point position made in the initial setting level.

Use the [R/S] and [▼] keys to change the settings.

2. PV

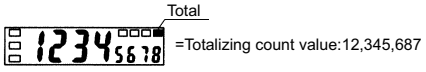
The No. 1 display will show the preset value and the No. 2 display will remain blank. The values displayed will be determined by the settings for Counter/Timer selection, time range, timer mode, and decimal point position made in the initial setting level.

Press the [R/S] key to reset the present value.

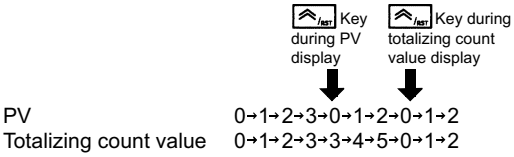
3. Totalizing Count Value

The totalizing count value is displayed only if "totalizing counter used" in the advanced function setting level has been set to ON.

The leftmost four digits of the 8-digit totalizing count value will be shown in No. 1 display and the rightmost four digits will be shown in No. 2 display.



Press the [R/S] Key to simultaneously reset the totalizing count value and the preset value.

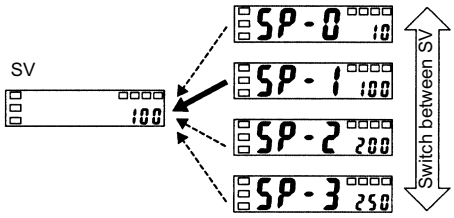


Refer to ***Input/Output Mode Settings*** on page 3-17 for information on totalizing counter operation.

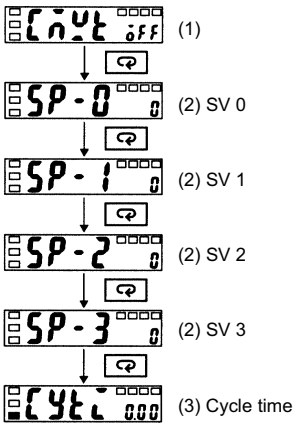
4. SV-bank (n-SP)

SV-bank is displayed only when "SV-bank used" in the advanced function setting level has been set to ON.

Select the SV-bank (SV 0…3). To use the SV-bank function, the four set values (SV 0…3) can be preset in the adjustment level. The keys on the front of the unit can then be used during operation to switch between the set values.



Adjustment Level



Adjustment Level, SV 0 to 3 (SP-0 SP-1 SP-2 SP-3)

1. **SV 0 to 3 is displayed only when "SV-bank used" in the advanced function setting level has been set to ON.**

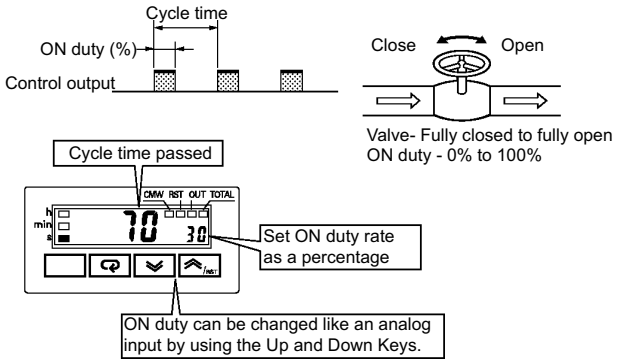
Used to set the set value when the SV-bank function is used. The operator can use the keys on the front to switch between the set values (SV 0 to 3). When the set value is changed in operation mode, the set value (SV 0 to 3) set in the adjustment level for SV-bank will also change.

2. **Cycle Time (CYCT)**

Cycle time is displayed only when the "output mode for timer function" in the initial setting level has been set to "Z."

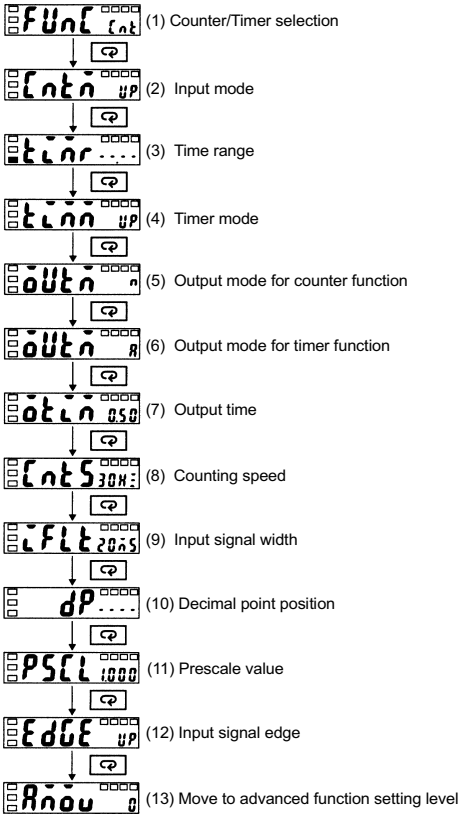
Sets the cycle time used for ON/OFF-duty adjustable repeat cycle mode (Z). Cyclic control can be performed easily in ON/OFF-duty adjustable repeat cycle mode by first setting the cycle time in the adjustment level and by using the set value in operation level to change the ON-duty ratio.

Controlling the flow rate by opening and closing the electromagnetic valve by pulse control.



Refer to the **Input/Output Mode Settings** on page Input/Output Mode Settings for information on ON/OFF-duty adjustable repeat cycle mode operation.

Parameters—Initial Setting Level


(1) Counter/Timer selection
(2) Input mode
(3) Time range
(4) Timer mode
(5) Output mode for counter function
(6) Output mode for timer function
(7) Output time
(8) Counting speed
(9) Input signal width
(10) Decimal point position
(11) Prescale value
(12) Input signal edge
(13) Move to advanced function setting level

1. Counter/Timer Selection (*FUnC*)

Select to use the 700-HXM Digital Timing Relay/Counter as either a counter or a timer.

2. Input Mode (*Cnt1*)

The input mode is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

When the 700-HXM Digital Timing Relay/Counter is to be used as a counter, select increment, decrement, individual, or quadrature for the input mode. If increment or decrement is selected, the input signal edge for CP1 (count input) can be switched using the input signal edge setting.

Refer to ***Input/Output Mode Settings*** on page 3-17 for information on ON/OFF-duty adjustable repeat cycle mode operation.
Refer to ***Input/Output Modes and Count Values*** on page3-16 for information on input mode operations.

3. Time Range (*tIMr*)

The time range is displayed only when "Counter/Timer selection" in the initial setting level has been set to timer.

When the 700-HXM Digital Timing Relay/Counter is to be used as a timer, set the time range to be timed.

4. Timer Mode (*tIMd*)

The timer mode is displayed only when "Counter/Timer selection" in the initial setting level has been set to timer.

When the 700-HXM Digital Timing Relay/Counter is to be used as a timer, set the elapsed or remaining time mode.

5. Output Mode for Counter Function (*oUt1*)

The output mode is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

When the 700-HXM Digital Timing Relay/Counter is to be used as a counter, set the output mode.

Refer to ***Input/Output Mode Settings*** on page 3-17 for information on output mode operations.

6. Output Mode for Timer Function (*oUt1*)

The output mode is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

When the 700-HXM Digital Timing Relay/Counter is to be used as a timer, set the output mode.

Refer to ***Input/Output Mode Settings*** on page 3-17 for information on output mode operations.

7. Output Time (otim)

The output time is displayed only when "output mode for counter function" in the initial setting level has been set to C or K or when "output mode for timer function" in the initial setting level has been set to A or B .

When using one-shot output in the 700-HXM Digital Timing Relay/Counter, set the output time for the one-shot output (0.01…99.99 s).

One-shot output can be used only when the C or K output mode is selected for counter function or A or B output mode is selected for timer function.

If the output time is set to "0" when selecting timer function, the output will be held. The output time cannot be set to "0" for counter function.

8. Counting Speed (Cnt5)

The counting speed is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

When the 700-HXM Digital Timing Relay/Counter is used as a counter, the operator can switch between maximum counting speeds (30 Hz/5 kHz) for CP1 and CP2.Set to 30 Hz when using a contact for the input signal. When the counting speed is set to 30 Hz, input signal chattering is removed.

9. Input Signal Width (iFLt)

Switches between minimum input signal widths (20 ms/1 ms) for start, reset and gate inputs. All input signal widths are set together via external input.

When the counter function is selected, only the reset input is set, but when the timer function is selected the start, gate, and reset inputs are all set together.

Set to 20 ms when using a contact for the input signal. When the input signal width is set to 20 ms, input signal chattering is removed.

10. Decimal Point Position (dP)

The decimal point position is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

This determines the decimal point position for PV, SV, SV-bank (SV 0 to 3), and totalizing count values. Press the key to move the decimal point to the left and press the Key to move it to the right.

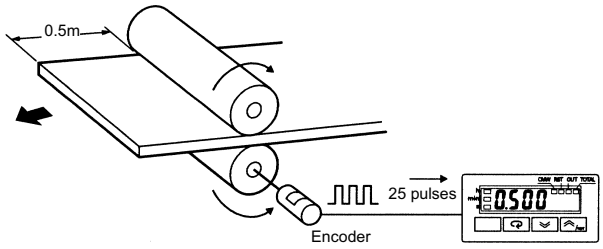
11. Prescale Value (PSCL)

The prescale value is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

Converts the counter input pulse to any value within the setting range (0.001 …9.999).

Example: To have a display of □□.□□ min. for a system that outputs 25 pulses when the object has been moved forward 0.5 meters, perform the following steps.

1. Set the decimal point position to before the second-last digit.
2. Set the prescale value to 0.02 (0.5 ÷ 25).



12. Input Signal Edge (EdGE)

The input signal edge will be displayed only when the "input mode" at the initial setting level has been set to increment or decrement.

Switches the CP1 input edge when the 700-HXM is used as an incrementing or decrementing counter. In the counter increment or decrement modes, CP2 will function as the gate input and CP1 counting will be prohibited while CP2 is ON.

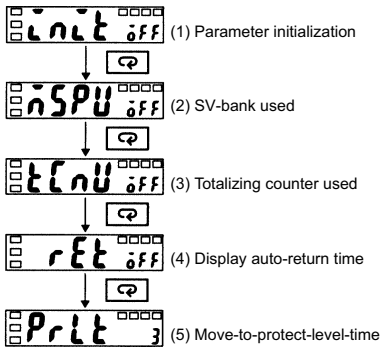
Refer to ***Input/Output Modes and Count Values*** on page 3-16 for information on input mode operations.

13. Move to Advanced Function Setting Level (AñöU)

This will be displayed only when the "initial setting protection" in protect level is set to 0.

This setting enables the advanced function settings to fully utilize the counter/timer functions. To move to the advanced function setting level, enter the password (-169) from the initial setting level.

Parameters—Advanced Function Setting Level



1. Parameter Initialization (*inIt*)

Used to return all settings to default values.

Turn ON parameter initialization and shift to another display to return all settings to default values.

2. SV-bank Used (*nPSU*)

Set "SV-bank used" to ON and operate the keys from the panel to switch between SV 0 to 3.

To use the SV-bank function, the set value (SV 0 to 3) must be set beforehand in the adjustment level. These set values are then used during operation by operating the keys on the front of the Unit.

3. Totalizing Counter Used (*tCnU*)

Set totalizing counter use to ON to display and enable use of the totalizing counter in the operation level.

The totalizing counter displays the leftmost four digits of the 8-digit totalizing count on No. 1 display and the rightmost four digits on No. 2 display to enable 8-digit counting.

4. Display Auto-return Time (*rEt*)

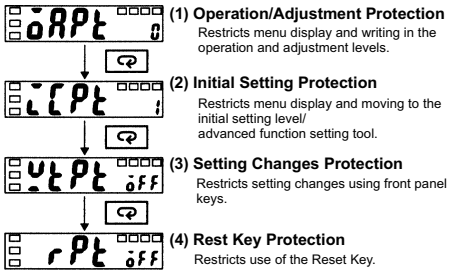
If this function is used, the display in the operation and adjustment levels will automatically return to the PV/SV display if no key operations have been made for the set period. (setting range: 1…99 s.)

The time before auto-return of the display can be set here. If this setting is set to OFF, the auto-return function will not operate.

5. Move-to-protect-level Time (*PrLt*)

If the and keys are pressed for more than 3 seconds in the operation level, the display will move to the protect level. Use this setting to change the time that the key must be pressed to within the setting range (3…30s).

Parameters—Protect Level


(1) Operation/Adjustment Protection
Restricts menu display and writing in the operation and adjustment levels.
(2) Initial Setting Protection
Restricts menu display and moving to the initial setting level/ advanced function setting tool.
(3) Setting Changes Protection
Restricts setting changes using front panel keys.
(4) Rest Key Protection
Restricts use of the Reset Key.

1. Operation/Adjustment Protection ( )

The following table shows the protection given for each setting level.

Setting level	Operation level		Adjustment level
	PV/SV	Other	
0	Not protected	Not protected	Not protected
1	Not protected	Not protected	No display, no level shift
2	Not protected	No display, no level shift	No display, no level shift
3	Display only	No display, no level shift	No display, no level shift

Not protected:Display and setting changes are possible.
Display only:Display is possible.
No display, no level shift: Display and level shifts are not possible.
The initial setting level is 0 and no protection is given at this setting level.

2. Initial Setting Protection ( )

Moving to initial setting, or advanced function setting levels is restricted.

Setting	Initial setting level	Advanced function setting level
0	OK	OK
1	OK	NO
2	NO	NO

OK: Move to other levels possible
NO: Move to other levels not possible
The default setting is 1.

3. Setting Change Protection (SETPT)

Restricts setting changes using front panel keys.

Setting	Meaning
OFF	Settings can be changed by key operation.
ON	Settings cannot be changed by key operation. (Only protect level settings can be changed.)

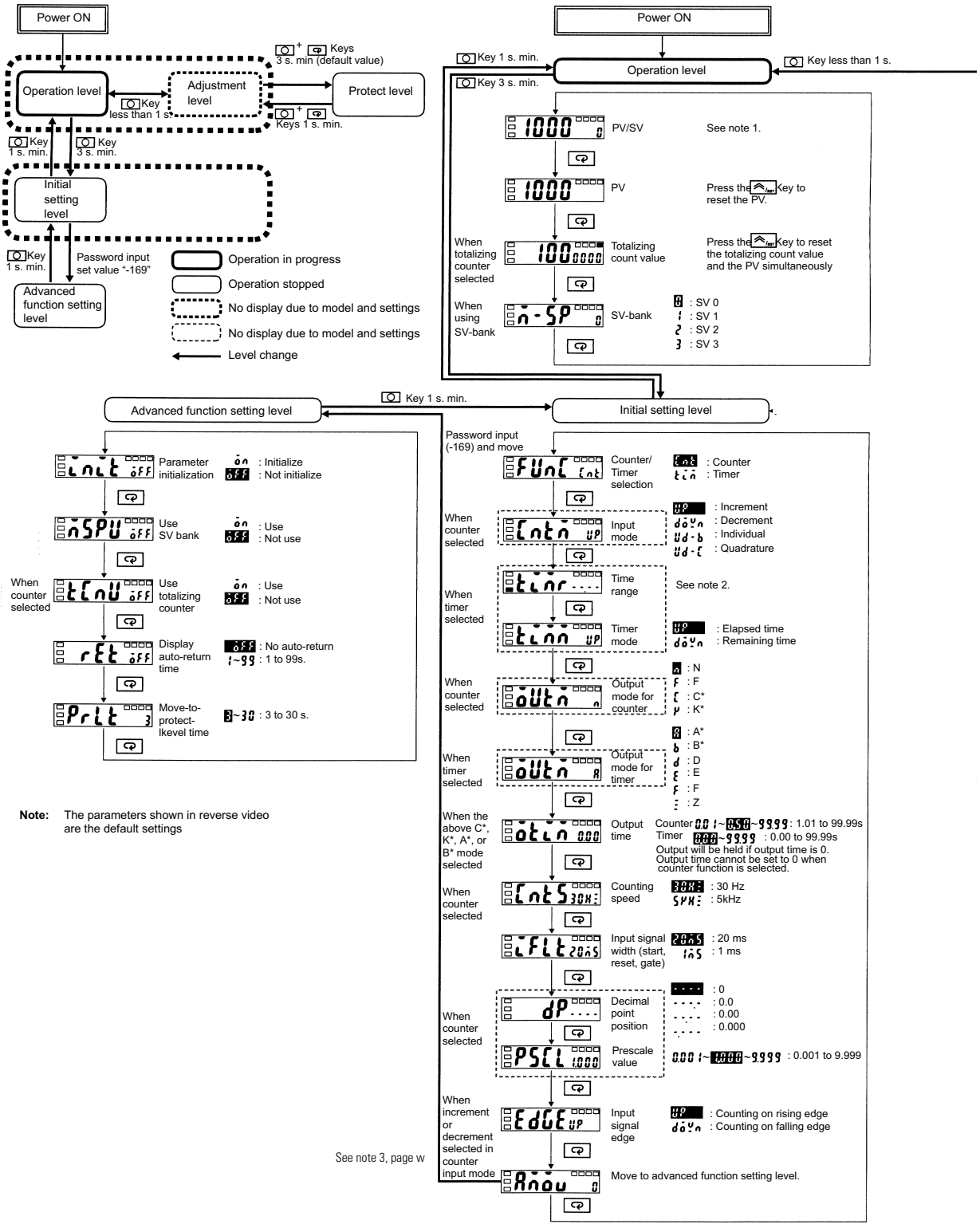
The default setting is OFF.

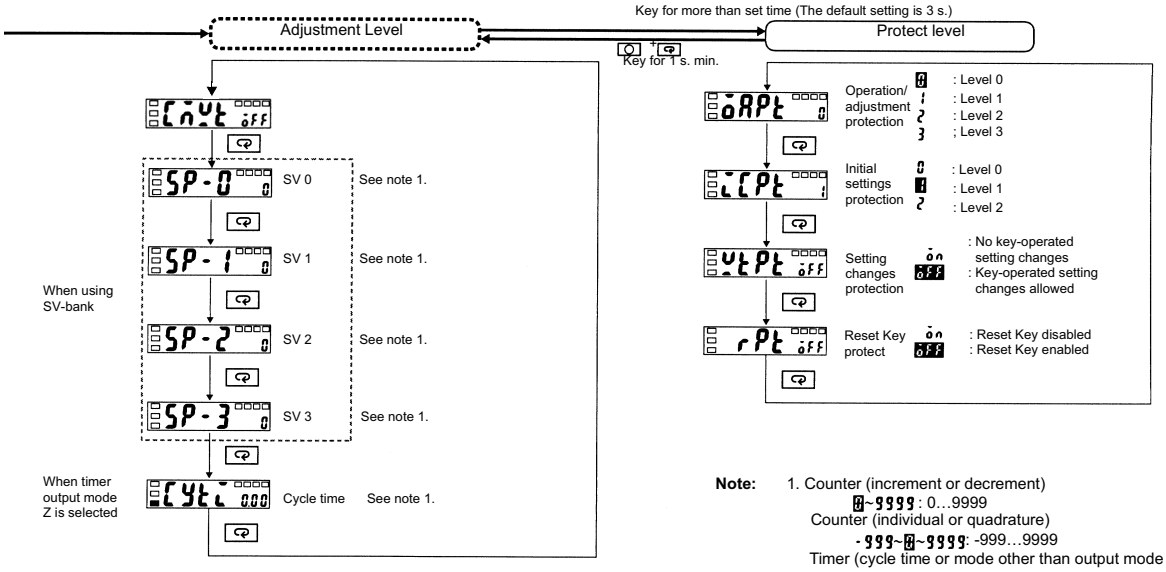
4. Reset Key Protect (rPT)

Prohibits the use of the Reset Key.

Setting	Meaning
OFF	PV and totalizing count values can be reset by the Reset Key.
ON	PV and totalizing count values cannot be reset by the Reset Key.

The default setting is OFF.


Power ON
Operation level
Adjustment level
Protect level
Key less than 1 s.
Keys 3 s. min (default value)
Keys 1 s. min.
Key 1 s. min.
Key 3 s. min.
Initial setting level
Key 1 s. min.
Password input set value "-169"
Advanced function setting level
Operation in progress
Operation stopped
No display due to model and settings
No display due to model and settings
Level change
Power ON
Key 1 s. min.
Operation level
Key less than 1 s.
Key 3 s. min.
PV/SV
See note 1.
PV
Press the Key to reset the PV.
When totalizing counter selected
Totalizing count value
Press the Key to reset the totalizing count value and the PV simultaneously
When using SV-bank
SV-bank
: SV 0
: SV 1
: SV 2
: SV 3
Key 1 s. min.
Advanced function setting level
Initial setting level
Parameter initialization
: Initialize
: Not initialize
Use SV bank
: Use
: Not use
When counter selected
Use totalizing counter
: Use
: Not use
Display auto-return time
: No auto-return
: 1 to 99s.
Move-to-protect-lkevel time
: 3 to 30 s.
Password input (-169) and move
Counter/ Timer selection
: Counter
: Timer
When counter selected
Input mode
: Increment
: Decrement
: Individual
: Quadrature
When timer selected
Time range
See note 2.
Timer mode
: Elapsed time
: Remaining time
When counter selected
Output mode for counter
: N
: F
: C*
: K*
When timer selected
Output mode for timer
: A*
: B*
: D
: E
: F
: Z
When the above C*, K*, A*, or B* mode selected
Output time
Counter : 1.01 to 99.99s
Timer : 0.00 to 99.99s
Output will be held if output time is 0.
Output time cannot be set to 0 when counter function is selected.
When counter selected
Counting speed
: 30 Hz
: 5kHz
Input signal width (start, reset, gate)
: 20 ms
: 1 ms
When counter selected
Decimal point position
: 0
: 0.0
: 0.00
: 0.000
Prescale value
: 0.001 to 9.999
When increment or decrement selected in counter input mode
Input signal edge
: Counting on rising edge
: Counting on falling edge
Move to advanced function setting level.
Note: The parameters shown in reverse video are the default settings
See note 3, page w



Note: 1. Counter (increment or decrement)

0~9999 : 0…9999

Counter (individual or quadrature)

-999~0~9999: -999…9999

Timer (cycle time or mode other than output mode Z)

0.000~9.999 : 0.000…9.999 s

00.00~99.99 : 0.00…99.99 s

000.0~999.9 : 0.0…999.9 s, min, h

0~9999 : 0…9999 s, h

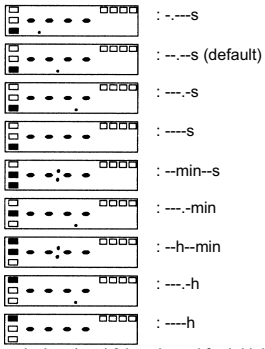
00:00~99:59 : 0 min 00 s to 99 min 59 s

000:0~999:9 : 0 h 00 min to 99 h 59 min

Timer (output mode Z)

0~100: 0% to 100 % (ON duty)

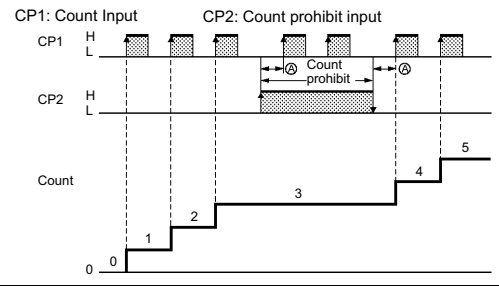
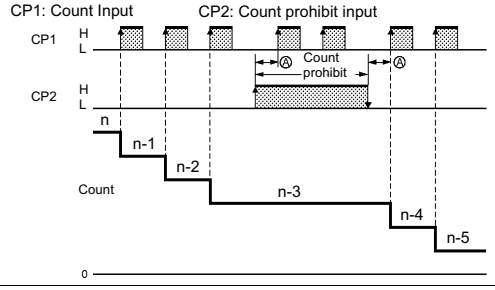
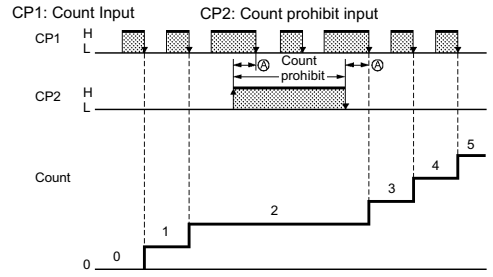
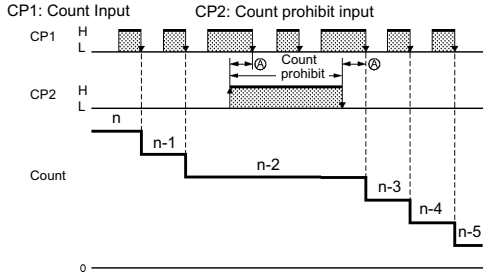
2. Time range

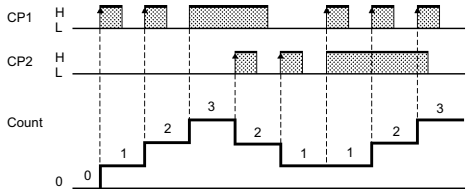
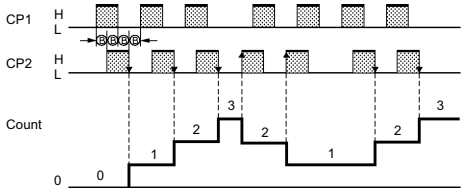


3. Displayed when level 0 is selected for initial setting protection in the protect level.

Input/Output Modes and Count Values

Note: H = Short-circuited
L = Open

		Up (Increment) Mode ❶	Down (Decrement) Mode ❶
Input edge	**UP**		
	DOWN		

Up/Down B Individual Input	Up/Down C Quadrature Input ❶
	

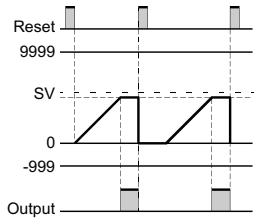
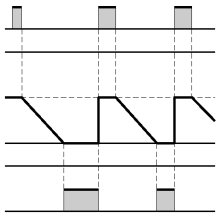
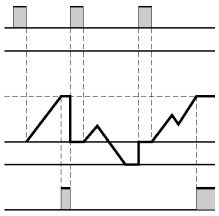
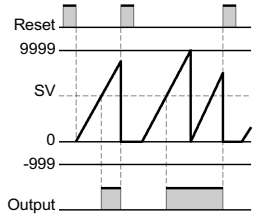
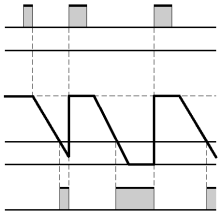
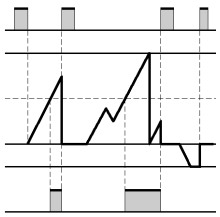
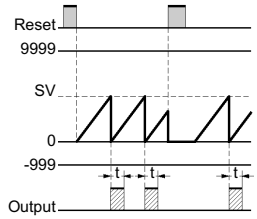
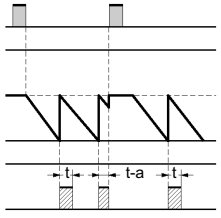
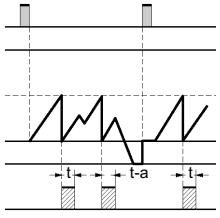
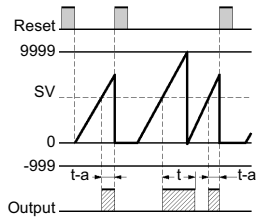
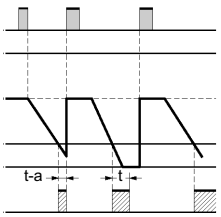
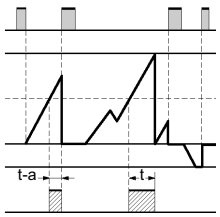
❶(A) indicates the minimum signal width and (B) requires at least 1/2 the minimum signal width. If these conditions are not met, a counting error (+1 or -1) may occur.

Input/Output Mode Settings

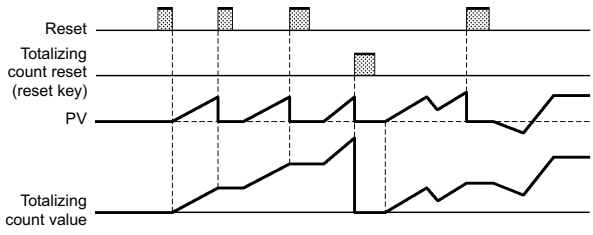
Counter Function

If there is a power failure during output ON, output will turn ON again when the power supply has recovered. For one-shot output, an output will be made again for the duration of the output time setting once the power supply has resumed. Output timing restarted during one-shot outputs is ignored.

Note: t-a:Less than the output time
t:Output time

		Input Mode		
		Up	**Down**	**Up/Down B.C**
Output mode	N			
	F			
	C			
	K			

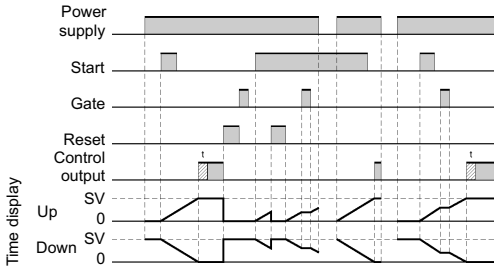
Totalizing Counter Operation



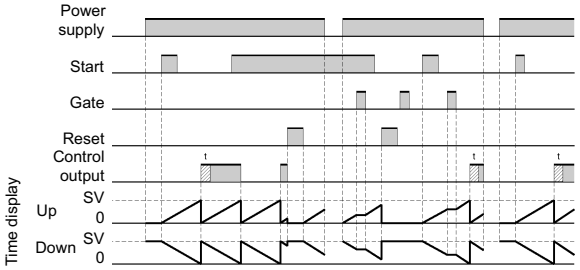
- Totalizing counter continues to count the present value, regardless of whether a reset input (by the reset key) has been made to reset the PV.
- When totalizing count value is reset, the PV is reset at the same time.
- The totalizing count range is 0…99,999,999. If the totalizing count exceeds 99,999,999, the count returns to 0. If the count drops below 0, it becomes 99,999,999.

Timer Function

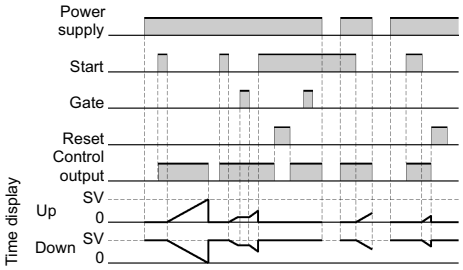
A Mode: Signal ON-Delay ❶



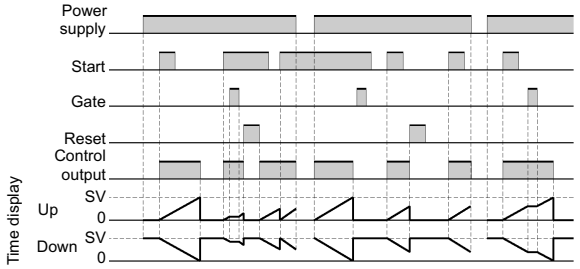
B Mode: Repeat Cycle ❶



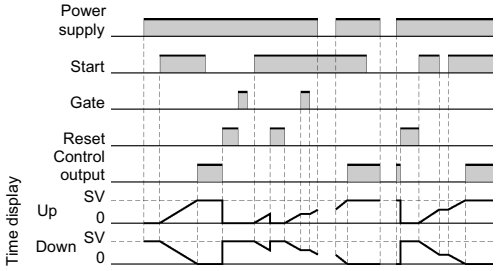
D Mode: Signal OFF-Delay



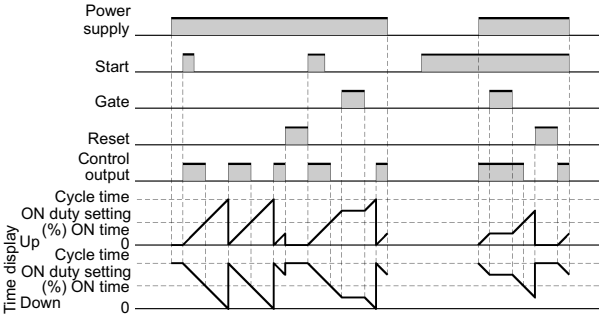
E Mode: One Shot



F Mode: Accumulative



Z Mode: ON/OFF-Duty Adjustable Repeat Cycle

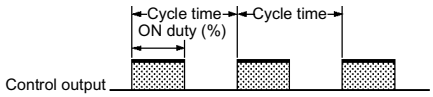


❶One-shot output or HOLD output can be selected for output:

Z Mode

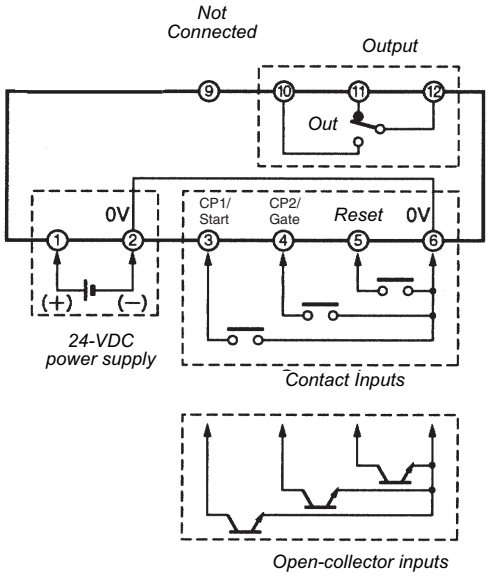
Output quantity can be adjusted by changing the cycle time set in the adjustment level to 1 and by changing the ON duty (%) set value.

The set value shows the ON duty (%) and can be set to a value between 0 and 100 (%). When the cycle time is 0, the output will always be OFF. When the cycle time is not 0 and when ON duty has been set to 0 (%), the output will always be OFF. When ON duty has been set to 100 (%), the output will always be ON.



Installation

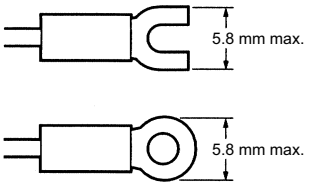
Terminal Arrangement



Note: (2) and (6) are connected internally. Do not employ unused terminals as relay terminals.

Wiring

Using the following type of crimp terminals for M3 screws.



Troubleshooting

Display

When an error occurs, the error code is displayed on the main display. Take countermeasures according to the code.

No. 1 display	No. 2 display	Error contents	Countermeasure
E111	No display	Memory error (RAM)	Turn the power OFF and ON again. If normal operation is still not restored, it may be necessary to repair or replace the 700-HXM Digital Timing Relay/Counter. If normal operation is restored by turning the power supply OFF and ON, it is possible that there is noise interference. Check that there is nothing in the vicinity that may be the source of noise.
E111	SUM	Memory error (EEP)	
E1	No display	CPU error	
- - - - LASHES OF 5	Set value displayed or no display	Present value underflow	This is not an actual error. This display indicates that the present value has dropped to a value less than -999. Reset using reset input or pressing the Up Key when "- - - -" is displayed.

Note: Error codes are displayed only if PV/SV or PV is being displayed.

Precautions

ATTENTION

Do not use the product in locations subject to flammable or explosive gases. Doing so may result in explosion.

ATTENTION

The service life of the output relays depends upon the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life. Using the product beyond its service life may result in contact deposition or burning.

ATTENTION

Do not disassemble, repair, or modify the product. Doing so may result in electric shock, fire or malfunction, and will also void the warranty.

ATTENTION

Do not allow metal objects or conductive wires to enter the product. Doing so may result in electric shock, fire, or malfunction.

Other Precautions

- Store at the specified temperature. If the 700-HXM Digital Timing Relay/Counter has been stored at a temperature of less than -10°C, allow the 700-HXM Digital Timing Relay/Counter to stand at room temperature for at least 3 hours before use.
- Use the product within the ratings specified for vibration, shock, submerging in water, and exposure to oil.
- Do not use the product in locations subject to dust, corrosive gases, or direct sunlight.
- Use the product within the ratings specified for temperature and humidity.
- The product is designed for 24V DC. Applying voltages other than the rated one such as 100…240V AC may damage the internal elements.
- Separate the input signal devices, input signal cables, and the product from the source of noise or high-tension cables producing noise.
- Separate the product from the source of static electricity when using the product in an environment where a large amount of static electricity is produced (e.g., forming compounds, powders, or fluid materials being transported by pipe).
- Do not expose the product to organic solvent such as thinner or benzine, strong alkali materials, or strong acid materials. Doing so may damage the product surface.

Application Precautions

1. Do not use the product in locations where condensation may occur due to high humidity or where temperature changes are severe.

2. Be sure to wire terminals correctly, with the correct polarity.

3. Maintain the power supply voltage within the allowable ranges.

4. Connect the power supply through a relay or switch so that the voltage reaches a fixed value immediately. If the voltage increases gradually the power supply may be reset or outputs may turn ON.

5. When the power is turned ON, an inrush current (approx. 15 A) will flow momentarily. Depending on power supply capacities, the product may not start due to this leakage current. The power supply must be of a sufficiently large capacity.

6. For the main power supply or the power supply for input devices, use a power supply transformer whose primary side is insulated from the secondary side and whose secondary side is not grounded.

7. Leaving the 700-HXM Digital Timing Relay/Counter with outputs ON at a high temperature for a long time may hasten the degradation of internal parts (such as electrolytic capacitors). Therefore, use the product in combination with relays and avoid leaving the product as long as more than 1 month with the output turned ON.

Changing the Set Value

In Counter Operation

When changing the set value during operation, the output will turn ON if the set value equals the present value.

In Timer Operation

When changing the set value during operation, if the set value is changed in so that the conditions below are satisfied, the Timer operates in the same way as when the present value reaches the set value. This is because a constant read-in system is in use. Depending on the output mode, this may result in output turning ON.

Timer mode UP:	Present value y set value
Timer mode DOWN:	Elapsed time y set value (Present value = 0)

Note: When in DOWN mode, the amount set value is changed is added to or subtracted from the present value.

Operations with a Set Value of "0"

In Counter Operation

The output will turn ON if the set value (0) equals the present value. The output will be OFF while the Reset Key is pressed or the reset input is ON.

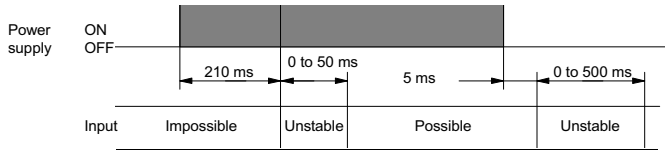
In Timer Operation

a) When the output mode is set to A, B (one-shot output), D, or F, output will turn ON when the start signal is input.

b) When the output mode is set to B (hold output), E, or Z, output will remain OFF even when the start signal is input.

Power Supplies

When turning the power ON and OFF, input signal reception is possible, unstable, or impossible as shown in the diagram below.



Turn the power ON and OFF using a relay with a rated capacity of 15 A minimum to prevent contact deterioration due to inrush current caused by turning the power ON and OFF.

When power is turned ON, a starting current flows momentarily. Therefore, pay attention to the overcurrent detection level of the power supply used.

Timer Control with Power Start

To allow for the startup time of peripheral devices (sensors, etc.), the 700-HXM Digital Timing Relay/Counter starts timing operation between 210…260 ms after power is turned ON (see diagram above). For this reason, in operations where timing starts from power ON, the time display will actually start from 258 ms. If the set value is 258 ms or less, the time until output turns ON will be a fixed value between 210 and 260. (Normal operation is possible for set value of 259 ms or more.) In applications where a set value of 258 ms or less is required, use start timing with signal input.

When the 700-HXM Digital Timing Relay/Counter is used with power start in F mode (i.e., accumulative operation with output on hold), there will be a timer error (approximately 100 ms each time the 700-HXM Digital Timing Relay/

Counter is turned ON) due to the characteristics of the internal circuitry. Use the 700-HXM Digital Timing Relay/Counter with signal start if timer accuracy is required.

Response Delay Time When Resetting

The following table shows the delay from when the reset signal is input until the output is turned OFF.

Minimum reset signal width	Output delay time
1 ms	3.7 …6.0 ms
20 ms	19…21 ms

Output Delay Time

The following table shows the delay from when the timer value passes the set value until the output is produced.

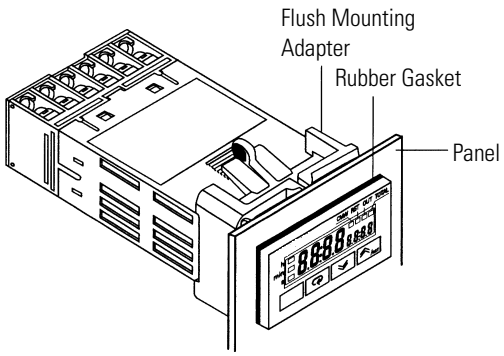
Actual Measurements in N or K Mode

Control output	Max. counting speed	Output delay time ❶
Contact output	30 Hz	17.3…18.9 ms
	5 kHz	3.5 …5.2 ms

❶ The variation in delays is due to different modes and conditions.

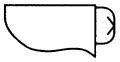
Mounting

Tighten the two mounting screws on the Adapter. Tighten them alternately, a little at a time, so as to keep them at an equal tightness.



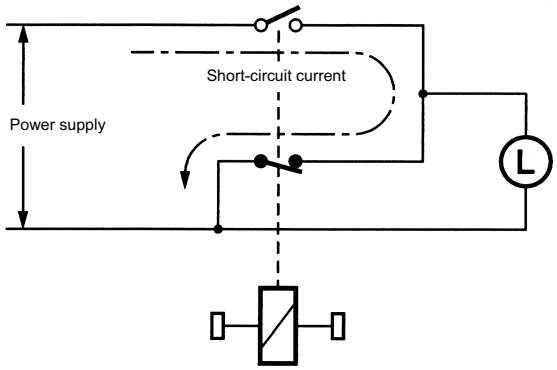
The 700-HXM Digital Timing Relay/Counter's panel surface is water resistant (conforming to NEMA 4 (indoors) and IP66). In order to prevent the internal circuit from water penetration through the space between the counter and

operating panel, attach a rubber packing (provided with the 700-HXM Digital Timing Relay/Counter) between the counter and operating panel and secure the rubber packing with the Flush-mounting Adaptor.



Output

The SPDT (single-pole, double-throw) consists of an SPST-NO contact and an SPST-NC contact. Do not form a circuit with 3-point short-circuit (power short-circuiting with arc).



Parameters List

Fill in your set values in the *Set value* column of the following tables and use the tables for quick reference.

Protect Level

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Operation/Adjustment Protection	oAPt	0...3	0		
Initial Setting Protection	IIPt	0...2	1		
Setting Change Protection	SEPt	on/ oFF	oFF		
Reset Key Protection	rPt	on/ oFF	oFF		

Operation Level

Parameter name			Parameter	Setting (display) range	Default value	Unit	Set value
Present value (PV)/ Set Value (SV)	PV	Counter		-999…9999/- - - (PV<-999)	0		
		Timer		0.000…9.999 s	0.000	Second	
				0.00…99.99 s	0.00	Second	
				0.0…999.9 s	0.0	Second	
				0…9999 s	0	Second	
				0:00…99:59 min. s	0:00	Minute: Second	
				0.0…999.9 min.	0.0	Minute	
				0:00…99:59 h min.	0:00	Hour: Minute	
				0.0…999.9 h	0.0	Hour	
				0…9999 h	0	Hour	
	SV	Counter		0…9999 (Input mode=Up or Down)	0		
				-999…9999 (Input mode=Individual or quadrature)	0		
		Timer (Output mode: A, B, D, E, F)		0.000… 9.999 s	0.000	Second	
				0.00 …99.99 s	0.00	Second	
				0.0…999.9 s	0.0	Second	
				0…9999 s	0	Second	
				0:00 …99:59 min. s	0:00	Minute: Second	
				0.0…999.9 min.	0.0	Minute	
				0:00…99:59 h min.	0:00	Hour: Minute	
				0.0…999.9 h	0.0	Hour	
				0…9999 h	0	Hour	
		Timer (Output mode: Z)		0… 100	0	%	
PV				Same as for PV in the above PV/SV column.			
Totalizing count value				0…99999999	0		
SV-bank			A-SP	0/ 1/2/3	0		

Adjustment Level

Parameter name		Parameter	Setting range	Default value	Unit	Set value
SV 0		SP-0	Same as for PV in the above PV/SV column.			
SV 1		SP-1	Same as for PV in the above PV/SV column.			
SV 2		SP-2	Same as for PV in the above PV/SV column.			
SV 3		SP-3	Same as for PV in the above PV/SV column.			
Cycle time	Timer (Output mode=Z)	CYtC	0.000…9.999 s	0.000	Second	
			0.00…99.99 s	0.00	Second	
			0.0…999.9 s	0.0	Second	
			0…9999 s	0	Second	
			0:00…99:59 min. s	0:00	Minute : Second	
			0.0…999.9 min.	0.0	Minute	
			0:00…99:59 h min.	0:00	Hour: Minute	
			0.0…999.9 h	0.0	Hour	
			0…9999 h	0	Hour	

Initial Setting Level

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Counter/Timer selection		FUnC	Cnt/tim	Cnt		
Input mode		CntM	UP/dOWn/Ud-b/Ud-C	UP		
Time range		tRng	-.---S/--.--S/---.-S/----S/--mn--S/---.-mn/--H--mn/---.-H/----H	--.--	Second	
Timer mode		tMod	UP dOWn	UP		
Output mode for counter function		oUtC	n/f/c/k	n		
Output time	Counter	otC	0.01…99.99	0.50	Second	
	Timer		0.00…99.99	0.00	Second	

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Counting speed	CntS	30 H SPH	30 H		
Input signal width	CFLt	20 mS / mS	20 mS		
Decimal point position	dP	----/---.-/--.--/-.---	----		
Prescale value	PSCL	0.001 … 9.999	1.000		
Input signal edge	EdGE	UP dounn	UP		
Move to function setting level	AnoU	-999 …9999	0		

Advanced Function Setting Level

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Parameter initialization	InIt	on oFF	oFF		
SV-bank used	nSPU	on oFF	oFF		
Totalizing counter used	tCnU	on oFF	oFF		
Display auto-return time	rEt	oFF/1…99	oFF	Second	
Move-to-protect-level time	PrLt	3…30	3	Second	

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